

1 **Northern States Power Company d/b/a Xcel Energy**
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3 **EQB Docket No. 05-91-PPS-Xcel High Bridge**
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5 **IN THE MATTER OF APPLICATION TO THE MINNESOTA ENVIRONMENTAL**
6 **QUALITY BOARD FOR A GENERATING PLANT SITE PERMIT FOR THE**
7 **HIGH BRIDGE COMBINED CYCLE PROJECT**
8

9 **Direct Testimony**
10 **of**

11 **Susan C. Larson, P.E.**

12 **Project Director**
13 **(Xcel Energy Services Inc.)**
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1 **BEFORE THE ENVIRONMENTAL QUALITY BOARD**
2 **OF THE STATE OF MINNESOTA**
3 **DIRECT TESTIMONY OF SUSAN C. LARSON**
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5 **Q. Please state your name and business address.**

6 A. Susan C. Larson. 414 Nicollet Mall, Minneapolis, Minnesota 55401.

7 **Q: Briefly describe your professional experience.**

8 A: I graduated from the University of Minnesota in 1978 with a Bachelor of Science
9 degree in Mechanical Engineering. I have been working as an engineering and
10 project management professional for over 27 years in the power industry. I have
11 held various engineering and management positions at AB Volvo, General
12 Electric, Northern States Power Company (prior to the August, 2000 merger with
13 New Century Energies, Inc.), NRG Energy, Cummins Power Generation and
14 presently Northern States Power Company d/b/a Xcel Energy.

15 During my 24 years at Xcel Energy, I worked on a wide variety of power and
16 energy projects in various states. I have served as Project Engineer/Project
17 Manager for the construction of a number NRG Energy plants such as the
18 construction of the natural gas combined cycle Millennium Cogeneration Facility
19 in Morris, Illinois, two (2) natural gas-fired combustion turbine generator simple
20 cycle facilities in Louisiana and central heating and cooling plants for the
21 Minneapolis Energy Center and Pittsburg District Energy.

22 My career assignments have taken me to Sweden, Louisiana, Massachusetts,
23 Illinois, Pennsylvania, California, New York, Wisconsin, North Dakota, South
24 Dakota, Michigan, Pennsylvania, Colorado and Texas. I have worked on all
25 aspects of projects from detailed and systems engineering through project
26 management.

27 I am employed in the Xcel Energy Engineering and Construction Department as
28 Director, Project Services. Project Services provides project schedule and cost
 controls, and contracting and administrative services for the management of

1 projects at all of Xcel Energy's generating assets. I am currently Project Director
2 for the High Bridge MERP Combined Cycle Project, for which the Application is
3 submitted.

4 **Q. On whose behalf are you submitting this testimony?**

5 A. On behalf of the applicant, Northern States Power Company d/b/a Xcel Energy.

6 **Q: What is the purpose of your testimony?**

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8 A: My testimony is intended to support Xcel Energy's application to Xcel Energy's
9 application to the Minnesota Environmental Quality Board ("MEQB") captioned:
10 Application to the Minnesota Environmental Quality Board for a Generating Plant
11 Site Permit High Bridge Combined Cycle Project ("Site Application"), EQB Docket
12 No. 05-91-PPS-Xcel High Bridge.

13 **Q: Were you involved in the preparation of Xcel Energy's applications?**

14 A: Yes. I supervised and reviewed the preparation and submission of the Site
15 Permit Application.

16 **Q: Are you available to act as sponsor for particular sections of the**
17 **Application?**

18 A: Yes. I am sponsoring Chapter 2 (Project Description) and Chapter 3 (Engineering
19 and Operational Design) of the Site Permit Application.

20 **Q: Do you have any changes or corrections to make in these chapters of the**
21 **applications?**

22 A. Yes. Our design and procurement processes have progressed since our
23 application was filed, resulting in a few small changes to some of the parameters
24 in the project description. I list the changes in our application and the
25 Environmental Assessment below:

26 **CHANGE NO. 1**

27 With regard to gas supply, Xcel Energy's gas business unit has been selected to
28 provide natural gas to the plant. The Company's plan now is to utilize an existing

1 pipeline between Cedar and Mendota Heights Town Border Stations and build a
2 new 3 mile segment of pipeline between Mendota Heights and the plant.

3 **EQB Application**

4 Revise Section 2.1, High Bridge Combined Cycle Project as follows:

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6 "The Project is expected to be supplied with high-pressure natural gas via a high-
7 pressure natural gas pipeline connecting to the existing Northern Natural Gas
8 interstate pipeline at the Mendota Regulator Station, approximately 3 miles to the
9 west of the plant. Additional pipe replacements and additions may be necessary
10 to the existing pipeline between the Mendota Regulator Station and the Cedar
11 Town Border Station."

12 **Environmental Assessment**

13 Revise Section 2.1.9, PIPELINE as follows:

14 "A new pipeline will originate from the Northern Natural Gas (NNG) Mendota
15 Regulator Station, approximately 3 miles to the west. Additional pipe
16 replacements and additions may be necessary to the existing pipeline between
17 the Mendota Regulator Station and the Cedar Town Border Station. **(Figure 7).**"

18 **CHANGE NO. 2**

19 As a result of equipment procurement processes proceeding since the Application
20 was filed we now expect that the most likely combustion turbine manufacturer that
21 will provide the turbines for the Project will be Mitsubishi. The Application
22 technical information was generally based on the assumption that General
23 Electric combustion turbines would be used on the Project. While the two turbine
24 brands perform similarly, there are differences, particularly with regard to power
25 output and air emissions.

26 **EQB Application**

With regard to expected output of the plant under a variety of operating conditions, the Project utilizing Mitsubishi combustion turbines is expected to have different capacity from that presented in the Application previously.

Revise Table 2-1, HBCC Plant Capacity as follows:

Condition	Temperature, Rel. Humidity	Net Capacity Non-duct Firing	Net Capacity Duct Firing
Summer, with evaporative cooling	75 °F, 90%	500 MW	575 MW
Summer, without evaporative cooling	89 °F, 47%	480 MW	550 MW
Winter*	-12 °F, NA	565 MW	635 MW

*Winter condition was modeled above at -12 deg F, the winter ASHRAE 2.5% condition for St. Paul, MN

The generating capacity nominal range is also mentioned in the text in Sections 1 and 2.

Environmental Assessment

These modifications apply throughout the text when referencing nominal generating capability and apply to Table 1, Operational Information Summary.

CHANGE NO. 3

The building height requirement has been adjusted slightly since the application was filed to accommodate the Mitsubishi combustion turbines. The stack height requirements have been adjusted slightly since the application was filed based on air quality modeling results that have been completed as part of the Project's air permit application.

EQB Application

Make the following changes to Section 3.1.4, Facility Buildings and Structures:

"The building will be approximately 425 feet long by 350 feet wide and 110 feet tall."

"The stacks are anticipated to be 165 feet tall, ..."

1 **Environmental Assessment**

2 Make the following changes to 2.1.1, Description of Power Generating Equipment
3 and Processes:

4 “The building will be approximately 425 feet long by 350 feet wide and 110 feet
5 tall.”

6 “The stacks are anticipated to be 165 feet tall, ...”

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8 **CHANGE NO. 4**

9 This change is also the result of the slightly different operating parameters for the
10 Mitsubishi turbines compared to the General Electric turbines that were assumed
11 in the original Application.

12 **EQB Application**

13 Replace the 4th and 5th sentences of Section 3.4, page 3-10, 1st ¶, with the
14 following:

15 “If the Plant has been off line for less than ten hours, start up can be completed
16 within two hours (hot start). A warm start occurs when the Plant is started after
17 being shut down for ten to 72 hours and can be completed in three hours.”

18 **Environmental Assessment**

19 This change also affects Section 2.1, page 1 5th ¶ of the EA.

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21 **CHANGE NO. 5**

22 This change is also the result of the slightly different operating parameters for the
23 Mitsubishi turbines compared to the General Electric turbines that were assumed
24 in the original Application.

25 **EQB Application**

26 Revise Table 3-2, Fuel Requirements as follows:
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Fuel source	Natural gas via new distribution interconnection to Northern Natural Gas Interstate Pipeline
Natural gas volume requirements	3.5 million SCF/hr/CTG (summer conditions, with evaporative cooling, non-duct fired) 4.6 million SCF/hr/CTG (winter conditions, duct fired)
Heat Input	3,250 million Btu/hr /CTG LHV (summer conditions, with evaporative cooling, non-duct fired)) 4,300 million Btu/hr/CTG LHV (winter conditions, duct fired))

Environmental Assessment

These modifications apply to Table 5, Fuel Requirements.

CHANGE NO. 6

This table summarizes the operational characteristics of the plant, which are slightly different than presented in the Application because of the original assumed use of General Electric turbines rather than the likely Mitsubishi turbines.

EQB Application

Revise Table 3-3, Operational Information Summary as follows:

Description	Project Data
Normal generating capability	480-635 MW
Operating Cycle	Combined cycle w/duct firing & inlet air cooling
Typical Dispatch Schedule	16 hours per day (day time), 5 days per week (week days), year round
Estimated Starts	Cold – 1 per week (52 per year) Hot – 4 per week (208 per year)
Anticipated annual capacity factor	30% - 60%
Anticipated heat rate (efficiency)	6,460 Btu/kw-hr LHV (53%) non-duct fired 6,670 Btu/kw-hr LHV (51%) duct fired
Heat Rejected (through cooling water system at base load)	1,130 million Btu/hr non-duct fired 1,465 million Btu/hr duct fired

1 **Environmental Assessment**

2 These modifications apply to Table 1.

3 **CHANGE NO. 7**

4 The Application erroneously indicated in Figure 3-3 that anti-scaling and pH
5 adjustment additives would be added to the cooling water withdrawn from the
6 Mississippi River. Only anti-biofouling agents are expected to be added.

7 **EQB Application**

8 Change text in the top box in the Water Treatment column of Figure 3-3 to read:

9 “Anti-biofouling additives.”

10 **Environmental Assessment**

11 Change text in the top box in the Water Treatment column of Figure 6 to read:

12 “Anti-biofouling additives.”

13 **Q: Do you have any additional comments to make on the Environmental**
14 **Assessment for this Project prepared by the Minnesota Environmental**
15 **Quality Board?**

16 **A.** Yes, I would like to recommend two minor changes to the text as listed below:

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Location	Comment
Page 1, 5 th ¶	Replace the 4 th and 5 th sentences with the following: If the Plant has been off line for less than ten hours, start up can be completed within two hours (hot start). A warm start occurs when the Plant is started after being shut down for ten to 72 hours and can be completed in three hours.
Page 8, 1 st ¶	Discussion includes mention of set up of entrances as “first construction activity”. Preparatory construction activities will precede entrance construction as described in Application Section 3.2.

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26 **Q: Do any of these corrections materially change any of the analysis or**
27 **conclusions contained in the Application?**

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1 A. No.

2 **Q: Does this conclude your direct testimony?**

3 A: Yes, it does.

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